

Subject card

Subject name and code	Statistical inference, PG_00135494						
Field of study	Physical geography and geoinformation						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Climate Research Laboratory -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr Natalia Strojna				
	Teachers		mgr Natalia Strojna				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		15.0		15.0	60
Subject objectives	1. Familiarization with the methods of statistical inference. 2. Developmnet of the ability to apply statistical methods in practice with particular emphasis on problems in the study of physical geography. 3. Learning and practical use of R programming language in statistical inference analyses.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GFGMU2_U04] describe and analyze the causes and course of physical and geographical processes and phenomena, selecting and applying advanced techniques and research tools in the field of statistical and geoinformation methods, interpreting the results, using theoretical knowledge to formulate own opinions and conclusions	Student is able to describe and analyze the causes and course of climatological, hydrological and geomorphological processes and phenomena, skillfully selecting and applying advanced techniques and research tools from the field of statistical methods interpreting the results obtained as a consequence, and then using theoretical knowledge to formulate their own opinions and conclusions.	[SU3] text preparation/written work
	[GFGMU2_W02] issues in the field of exact sciences enabling the understanding of complex processes and phenomena occurring in the Earth's natural environment, and in their interpretations consistently rely on empirical foundations, using qualitative and quantitative methods	Student knows and understands the issues of science to understand the complex processes and phenomena of climatology, hydrology and geomorphology occurring in the Earth's natural environment, and in their interpretation consistently relies on empirical foundations, using qualitative and quantitative methods.	[SW3] text preparation/written work
	[GFGMU2_W04] theoretical foundations of research methods used in physical geography and closely related sciences, descriptive and mathematical statistics, as well as advanced methods of analyzing spatial phenomena	Student knows and understands the theoretical basis of research methods used in physical geography, especially climatology, hydrology and geomorphology, as well as in closely related sciences, descriptive and mathematical statistics, and advanced methods of analyzing spatial phenomena.	[SW3] text preparation/written work
	[GFGMU2_K03] accepting responsibility for group work assuming various roles in it, participating in preparation of scientific projects, taking responsibility for the equipment and safety rules, active developing of professional competences and knowledge in Earth and environmental sciences and geoinformation, including interdisciplinarity, as well as developing the principles of professional ethics, respecting copyright rules	Student is ready to assume responsibility for work in a group assuming various roles in it, participate in the preparation of scientific projects, is ready to actively expand professional competence and update knowledge in earth and environmental sciences and geoinformation, especially in climatology, hydrology and geomorphology enriching them with an interdisciplinary dimension, is ready to observe and develop the principles of professional ethics, including the observance of copyright in his own and others' activities.	[SK3] text preparation/written work [SK8] observation of student's independent or team work
	[GFGMU2_K01] critical assessment of knowledge in the field of Earth and environmental sciences and geoinformation, its completion and verification through critical analysis of scientific literature	Student is ready to critically assess his knowledge of the Earth and the environment and geoinformation, especially in the areas of climatology, hydrology and geomorphology, and is ready to complete and verify knowledge and skills in the area indicated above through critical reading of the literature of the scope outlined above.	[SK3] text preparation/written work

Subject contents	1. The concept and types of random variable. 2. Basic types of distributions of random variables (continuous and discrete). 3. The concept of random sampling in mathematical statistics. Techniques of random sampling. 4. Statistical estimation: the concept and properties of estimators; estimators: mean, variance, proportion and their properties; the concept and essence of interval estimation; principles of construction of confidence intervals for mean and proportion. 5. Verification of statistical hypotheses: the concept and types of statistical hypotheses; null and alternative hypothesis; principles of construction of statistical tests; significance level vs. critical area - critical level p. 6. Parametric tests: how to formulate hypotheses and define the critical area; tests for mean, proportion, two means, two variances, two proportions. 7. Non-parametric tests: the essence of non-parametric tests; tests of randomness; tests of concordance; tests of homogeneity. 8. Tests in correlation and regression analysis: test for correlation coefficient and linear regression; linearity test of regression function; chi-square independence test. 9. Tests in time series analysis: test for directional coefficient of a straight line; linearity of trend test. 10. Analysis of variance.		
Prerequisites and co-requisites	-		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	II written work accepted (with a passing grade)	51.0%	70.0%
	passing the colloquium with a positive grade	51.0%	30.0%
Recommended reading	Basic literature	Balicki A., Makać W., 2002, Metody wnioskowania statystycznego, UG, Gdańsk.	
		Biecek P., 2017, Przewodnik po pakiecie R, Oficyna wydawnicza GIS, Warszawa.	
		Gronicki M., Szreder M., 1992, Elementy rachunku prawdopodobieństwa i statystyki matematycznej, UG, Gdańsk.	
		Hellwig Z., 1993, Elementy rachunku prawdopodobieństwa i statystyki matematycznej, PWN, Warszawa.	
		Krzysko M., 1997, Statystyka matematyczna, UAM, Poznań.	
	Supplementary literature	Jóźwiak J., Podgórski J., 2000, Statystyka od podstaw, PWE, Warszawa.	
		Makać W., Urbanek-Krzysztofiak D., 2004, Metody opisu statystycznego, UG, Gdańsk.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Selection of appropriate tests. 2. Multivariate analysis. 3. What are and how to interpret Principal Components.		
Work placement	Not applicable		

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